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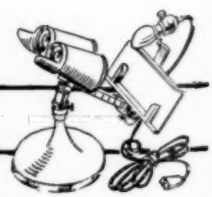

AMERICAN JOURNAL OF OPTOMETRY

Vol. 13 MARCH, 1936 No. 3

CONTENTS

ORIGINAL PAPERS

Personality and Psychotherapy. Arene T. Wray 81

Further Studies of the Fusional Convergence Amplitude. Part II. William J. Tait 92

EDITORIALS

Suggestions to Those who Advocate the Use of Visible Light Therapy by Optometrists. Carel C. Koch 100

Diagnosis of Glaucoma. Carel C. Koch 102

SPECIAL REPORT

Some Inconsistencies of the 18 Point Technique. Mathew O. Ranoe 112

BOOK NOTICES

Stimulus-Response Manual. Carl F. Shepard and Thomas G. Atkinson 115

The Principles of Optometry. F. L. Mason 116

ABSTRACTS

Field Studies in Eye Practice. Harold Simmerman 117

The Fourth Component of Refraction. Chester H. Johnson . 117

Pitfalls in Orthoptic Training. H. W. Gibson 118

The Clinical Use of Protection Lenses. G. H. Giles 118

Diathermy in the Treatment of Cataract. Thomas G. Atkinson 119

A Technique of Aniseikonia Control. Charles I. Saks 119

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AMERICAN JOURNAL OF OPTOMETRY

Vol. 13 MARCH, 1936 No. 3

PERSONALITY AND PSYCHOTHERAPY*

Arene T. Wray, Opt.D.
Los Angeles, Calif.

Personality is the quality of an individual's total behavior. It is how he acts when his activity is taken as a whole. Biologically the individual has certain fundamental needs for the satisfaction of which he makes demands upon his environment. This environment is a social one in which all other individuals possess the same needs and demands for their satisfaction. He, therefore, encounters obstructions and must constantly make adjustments which are conditioned by his inherited tendencies and the experiences he has had.

Personality can further be analyzed into factors which not only constitute it but also affect it. The individual's physique is possibly the first factor of his personality which impinges itself upon his fellow-beings. His mere size affects his attitude toward other people, as well as their attitude toward him. The tall, well-built athletic type of individual inspires confidence and admiration, which, in turn, bolsters up his self-esteem and tends to develop a feeling of superiority within him. On the other hand, the small, unimpressive, unattractive person might feel inferior, tending to develop his personality along either of the following lines. He might become hopelessly convinced of his inferiority and retire within himself, resulting in shyness, reticence and submission, or he might become pugnacious and overbearing in an effort to compensate for his inferior physique. A healthier form of compensation would be the striving for eminence in some field of endeavor. This possibly is an explanation of the achievements of a Steinmetz, of a Napoleon. The big fellow tends to dominate others easily by virtue of his size and so becomes good-natured; whereas the little fellow is apt to be strenuous and self-assertive.

The ancients classified persons as sanguine, choleric, phlegmatic and melancholic, depending upon the specific influence of each of the four great "humors" or fluids of the body—blood, bile, phlegm and spleen. That theory is now out-of-date. Superseding it is the modern theory that chemical substances, the endocrine secretions, color temperament. The irritable individual may be one with overactive adrenals; the strenuous one with overactive thyroid gland.

*Submitted for publication January 17, 1936.

All of one's organic needs, his motives and interests become factors in his personality. Poor appetite for food, strong sexual appetite, great resistance to fatigue are personal traits which affect social behavior. The individual's intellectual limitations also color his personality. One of low intelligence is likely to be lacking in tact and sympathy because he does not understand social situations. Intelligence may be a liability also, in that the more intelligent person demands more of his environment and more is demanded of him. A boy of high intelligence employed in humdrum work loses interest, becomes restless and dissatisfied. Such children may also be mishandled by their parents by the practice either of babying them or of demanding too much of them. The heavier the demands the more difficult the adjustment.

In the development of personality environmental factors play a significant role. The adjustments one makes at every age level condition the quality of the personality. The infant has all his needs cared for by adults, but gradually must become less dependent. When playing with other children he must adjust his demands to theirs. The advent of a subsequent child in the family causes an emotional upheaval for no longer is he the center of attraction. Social problems arise with attendance at school, adolescence, vocational adjustment, marriage and the responsibilities of parenthood.

This environmental factor in the development of the individual's personality consists largely of the demands of other people conflicting with the demands of the individual himself. Sometimes the external demands are excessive and sometimes the personal demands are excessive.

An effort has been made to classify personality according to types. Carl G. Jung expounded the theory that people can be classified as extroverts and introverts. The extrovert is one who thinks, feels and acts directly in accordance with objective conditions. He is more readily influenced by persons and things; adjusts himself quickly to the demands of his environment. He responds to stimuli with impulsive action, makes strong friends and strong enemies, has a keen sense of events and situations, sways and is swayed by emotional appeals. He is a good mixer, takes criticism lightly, is not finicky about food, enjoys himself and is ready to take part in any activity regardless of his real abilities.

The introvert, on the other hand, has more difficulty in adjusting himself to others and in making friends. He is analytic, self-conscious, rarely confides in others, dislikes to take part in sports, prefers sedentary occupations, is sensitive to criticism, is a poor mixer, likely to be meticulous about his dress, speech and manners. Because of his sensitiveness he frequently develops intense feelings of inferiority and socially undesirable habits and mannerisms in an attempt to overcome his imagined inferiority. He creates logical reasons for his behavior, and may suffer from emotional tension; tends to repress free emotional expression, and is likely to become depressed. Such an individual, should he develop a constitutional mental disorder, is likely to suffer from dementia praecox.

Jung believes that every person possesses both mechanisms and the relative dominance of one over the other determines the personality type. Woodworth, on the other hand, doubts that these traits necessarily group together and believes that introversion, for example, may cover two independent traits. Furthermore, tests of personality reveal a gradation of individuals with the greatest number in the middle range.

Ernst Kretschmer expounded the theory of constitutional types of personality. He classified people under three headings; first, the pyknic type who is the short, fat, good-natured individual; second, the asthenic type who is tall and thin; and third, the athletic type which is an intermediate one, the person of muscular build. The first, or pyknic type generally has a cycloid disposition; the asthenic and the athletic a schizoid disposition. The Kretschmer theory at the present time is greatly discounted and has lost favor.

This classification of individuals according to cycloid or schizoid disposition comes from the field of psychiatry. Rosanoff maintains that a cycloid temperament underlies the manifestation of manic-depressive psychosis; whereas a schizoid temperament is the basis for dementia praecox. The cycloid person is sociable and good-natured, oscillating between lively and depressed states. He corresponds to the extrovert in that the latter is very sociable and likes contacts with people. The schizoids are unsocial, reserved, timid, shy, nervous, eccentric, withdrawn within themselves. Likewise, they correspond to the introvert.

Alfred Adler regards personality from the individual's standpoint. Every individual has different defects and experiences and in consequence develops different modes of behavior. The child early discovers that his powers are inadequate for attaining his desires, the effect of which is a feeling of inferiority. This, he maintains, causes the individual to develop a mechanism known as the masculine protest—a struggle for power. He further believes that each individual develops his own pattern of behavior and that introversion and extroversion are not fixed characteristics.

The attitude of the psychoanalytic school of psychology is that personality is psychogenetic; i.e., the personality of a given individual depends upon the nature of his previous experiences. This school of thought explains many phenomena of personality in terms of unconscious mental activity. Ideas which cannot be accepted because of one's early training and social attitudes are relegated to the unconscious. These unconscious ideas are seeking expression; they are emotionally toned. The conscious aspect of mental life represses them and thus causes conflicts which influence the personality.

They further maintain that an individual's activities are determined by his desire to derive pleasure and to escape from pain. The child is guided by this principle more than the adult, not understanding the significance of reality which interferes with the attainment of his desires. As a result of his unconscious striving for pleasure, he develops a world of phantasy. As he grows older many of the desires attained previously

must be repressed in the unconscious. If the individual is unable to accept reality, these frustrations are one of the major causes of abnormal behavior.

Freud postulates two groups of instincts, the self-preservative or ego, and the sex. The unconscious sex drives (libido) are responsible for many personality reactions, he believes. Furthermore, he maintains the basis of most neurotic behavior is the individual's attempt to solve his unconscious sex problems. The psychoanalytic emphasis upon the psychogenic basis of mental abnormalities turned the attention of mental hygiene to preventative therapy with children.

An examination of these theories of types of personality might lead one to the conclusion that the personality of an individual is a highly complex organization of his inherited organic and physical traits conditioned and reconditioned by his constantly varying experiences, and that any theory which tries to explain in very simple fashion the manifestations of this highly complex thing cannot be entirely valid.

Although all experiences modify the personality there seem to be certain critical periods in which the development of definite traits is determined. These periods are characterized by the necessity of adjusting to new constellations of social problems. The first critical period in the growth of personality is that between the ages of two and three. At this time the child has developed an understanding of language and has begun to react to other people through the medium of speech. The beginning of the school period calls for adjustment to a larger environment and demands more socialization. The adolescent period requires the individual to adjust himself to an adult level of behavior. His emotional equilibrium and growth toward rational maturity depend upon his ability to strike a balance between his efforts for independence and the restrictions imposed upon him. In youth, that is the ages between seventeen and twenty, there are demands for adjustments in college, in problems of special training, and in the industrial world. To the young adult, the individual between twenty-five and thirty, are presented the problems of achieving economic security, a position in society and marriage. In our present-day chaotic social-economic conditions we can readily see that the emotional reserves of the most balanced personalities are taxed by well-nigh unsurmountable crisis situations in the environment, and hence the demands upon the large number of poorly adjusted individuals are excessive. Sherman next mentions the period between thirty-five and forty-five which he calls the crystallization period. At this time the individual takes serious account of himself; may be disappointed because of a seeming lack of progress. The problem of security in old age becomes more obvious and absorbing.

It is oftentimes desirable or necessary to diagnose an individual's personality, i.e., to arrive at a complete understanding of him and of his conduct. Such an eventuality might be his application for a position or the need for psychotherapeutic measures to overcome some emotional maladjustment. To this problem of diagnosing conduct there are two

lines of approach: one, the experimental with its laboratory techniques and psychological testing methods, and the other is the clinical approach. The former uses statistical methods and the latter the case history method.

The evidences of conduct to be measured consist of three types—descriptions of the environment, of reactions and of the results of conduct. A socially adequate environment leads to one type of conduct, whereas a poverty-stricken or cruel environment to another. From the environment one can predict future conduct to a certain extent. The conduct itself can be described by observation and tests or by rating methods, by means of questionnaires or interviews. In measuring the results of conduct the examiner must be very wary for the subject may conceal or misstate in order to appear in a favorable light. A questionnaire bearing an innocuous title such as "interest questionnaire" may allay his suspicions. It is also essential to obtain mutual understanding and cooperation between the examiner and the examined to arrive at a truthful set of answers. The guiding purpose for standardization of diagnosis of conduct through tests and measurements of personality is "the attempt to take the fallibility out of human judgment, the partiality from observation and the tendency to generalize on inadequate evidence out of conclusions." (Symonds)

Among the various tests of personality the following may be mentioned:

(1) Laird Personal Inventory. This consists of 48 questions about an individual's behavior during the preceding few months for the purpose of giving the degree of introversion or extroversion.

(2) Woodworth-Mathews Personal Data Sheet. This consists of 75 questions designed to elicit an individual's responses to a variety of personal relationships.

(3) Social intelligence tests. It is assumed that the degree of adequacy of an individual's social adjustments is dependent upon his social intelligence rather than his general intelligence. Most social intelligence tests, however, are modified general intelligence tests.

(4) Measurements of the Developmental Age (D-A). These were devised by Furfey to measure the stage of maturity of the individual as a whole.

(5) Pressy X-O Test. Form A for adults; Form B simpler. This is one of the most valuable of the indirect measures of personality. It gives clues regarding an individual's worries, anxieties and conflicts.

(6) Association Tests. The Kent-Rosanoff Association test is an outstanding type of this kind of test. It consists of 100 spoken words to which the patient must reply with the first word thought of. The responses of insane persons are evaluated in terms of their deviations from those of the normal. In analyzing his findings the examiner uses the following criteria. First, he considers the speed of reply, an extremely short reaction time indicating that the subject is attempting to avoid

replying with his usual associated word. A very long reaction time indicates that the stimulus word has aroused an unpleasant emotional attitude. The evasion of the stimulus word indicates conflict. The stimulus words to which the subject answers in an unusual fashion are then employed for further free association to obtain the significance of the responses.

(7) Attitude Tests. There are three groups of measurements of attitudes: the rating scales, questionnaires and tests, and mechanically objective measures. The rating scales consist of three types; namely, the self-rating, rating by others and ranking. In self-rating tests the subject makes an absolute judgment of the presence or absence of a given trait in himself. In some of these tests he checks the degree to which a given trait is present in himself. There may be a man-to-man comparison or the subject may compare himself with scale men on a number of traits. There may also be rating by others but this is not reliable as the rater may be too critical or too sympathetic. In the ranking tests the subject is ranked on the basis of a given number of items by observers or by the subject himself. The mechanically objective tests use physiological and psychological methods to record responses to controversial issues in order to test emotionally toned attitudes.

(8) Study of phantasies and daydreams. The basis for this test is the assumption that the individual resorts to phantasies and daydreams in an effort to overcome frustrations and attain his own desires.

(9) Analysis of the child's desires, worries and fears. A child's worries are related directly to his difficulties and his desires imply his attitude toward frustrations.

All of the above-mentioned tests exemplify the experimental approach to the problem of diagnosing personality. The clinical approach is that used by the psychiatrist or mental hygienist who tackles the problem from the angle of the emotional adjustments of childhood.

The nature of emotions is described variously by different psychologists. Watson holds for three primary inherited emotions—fear, anger and love. Harlow and Stagner (Theory of emotions, Psy. Review, 1933) believe emotions are derived by conditioning on the basis of four elementary affective states—pleasantness, unpleasantness, excitement and depression, and also cognizance of the stimulus. Emotions they believe are conscious attitudes toward stimulating conditions. Others believe specific emotions develop with experience from early undirected, aimless activity.

The manner of expressing fear changes with the age and experience of the individual starting with the first form that of massive bodily response of retreat from a noxious stimulus. Many fears of children such as fear of the dark, of noises and of animals, are the result of unwise training. The child with fears may develop a timid personality, become very cautious, make friends with difficulty, refuse to recite in class, cry too easily, lose confidence in himself and become a follower. A moderate degree of egocentricity may be a solution for fears, but often the ego-

centric trait develops too strongly in an effort to overcome the effect of the fears, and the timid child becomes too aggressive and overbearing.

Fear may also cause restlessness and depression in children, producing such an unresponsive attitude that others may question his intellectual ability. When a child begins to show fear of failure in school work, it is best to put him in a group where he can be successful without too much effort. This restores confidence. The use of fear in stimulating children often results in detrimental emotional reaction. The classroom attitude should be one of ease and encouragement. Competitive attitudes and prizes cause too much tension.

The expression of anger depends upon the age and training of the individual. Some children express it in temper tantrums which sometimes last through adulthood in the form of hysterical behavior. A child's anger may be expressed in kicking, screaming, or sulking, in retaliation by hurting the feelings of the offender. Older children express anger by resentments and hatreds. The child who is quick to resent criticism or to look for it may lose his friends and hence develop an egocentric attitude as a solace for this loss, or become a bully. Adults may express anger by profanity, by criticism or by refusal to speak.

A persistent anger pattern may, at times, become a worthwhile motive causing the individual to sublimate his anger and attempt to develop some specific ability to become superior to the person who supposedly thwarted him. Psychoanalysts have shown how people have triumphed in science, art and literature as a result of an insatiable desire to satisfy a wounded ego. On the other hand, sublimation of anger and hatred may result in excessive daydreaming.

Personality may be warped by morbid fears and phobias. A phobia may be defined as an intense fear or extreme discomfort in the presence of some object or situation, such as clautrophobia or fear of being in confined space, agoraphobia or fear of open spaces.

Phobias develop as the result of some intense fear experience *associated with a sense of guilt*. As a result of the sense of guilt the fear experience is repressed and it is difficult for the individual to find the explanation for his phobias. Fears during childhood should be treated promptly because of the possibility that a sense of guilt may be attached to them and a phobia result later on. A phobia of dirt and uncleanliness may cause an individual to wash his hands numerous times a day. This may be symbolic of an attempt to "wash away" sins due to a sense of guilt.

Ordinary fears differ from phobias. They arise from direct conditioning as a result of an unpleasant experience, as for instance, fear of animals. Phobias are symbolic of some more intense fear associated with a sense of guilt. Ordinary fears can be reconditioned by proper training, but to treat a phobia one must discover the individual's conflicts and his sense of guilt must be uncovered and resolved.

There are various types of mechanisms to which the individual may resort in order to adjust himself to his emotional problems. The

first of these is termed the compensatory mechanism. Every individual tries to compensate for his inferiorities, real or imagined; some in desirable ways and others in socially undesirable ways. Helen Keller is an outstanding example of the individual who compensates for his real inferiorities in a socially commendable manner. A child who demonstrates poor compensatory behavior for a feeling of neglect is one who tries to compel attention by mischief or extravagant actions. The excessively domineering individual is very often extremely subservient at work.

Another mechanism of personality adjustment is the escape mechanism. The individual attempts to escape from his feelings of inferiority or frustration by withdrawing to his own daydreams wherein he appears as the hero. Or he may resort to temper tantrums, sulkiness, neurotic pains, forgetting or hysterical attacks. Some neurotics spend a major part of their time in sleep and so evade facing issues. "Shell shock" was a method of escape used by many individuals in the World War to overcome their fears and obtain release from emotional trauma of war incidents.

Still other individuals may resort to a defense mechanism in their personality adjustments. This may be exemplified by a critical attitude toward others. Thus by taking the initiative in criticising others, the individual prevents criticism of himself. Intense interests and hobbies may function as defenses or as escapes.

One may also view the problem of personality adjustment from the standpoint of types of personality. For instance, the egocentric child when only three or fours years of age seeks attention by annoying others and thereby obtaining dominance. This egocentricity may have developed through overindulgence on the part of parents, by their extoling the virtues of the child in his presence. Upon entering school such a child immediately encounters difficulties in his contacts with other children. The competitive nature of the educational system creates a drive for superiority and intensifies the egocentric characteristics. So, if he cannot compete scholastically, he may become delinquent and obtain attention in that manner.

Egocentric behavior may result from an attempt to compensate for a feeling of inferiority. The egocentric child, unless properly treated, may develop paranoid ideas—ideas that others are persecuting him. The psychotherapeutic method of handling an egocentric child is to cease considering him a special child, but rather an ordinary individual who must conform to the demands of a reasonable social order without expecting unusual favors. Cooperation between the home and school is absolutely necessary.

The timid child realizing his lack of proper social outlets may take refuge in scholastic attainments. A substitute for actual experience is excessive reading, excessive day-dreaming. Fears, undue authority of parents or teachers may cause timidity in a child. This rigid discipline may induce a rebellious attitude producing delinquent behavior. Over-

protection by parents often causes a child to feel inferior, stifling his initiative and narrowing his social interests.

The hysterical child is resorting to an escape mechanism to solve his difficulties. Such behavior may manifest itself in headaches, bodily pains, paralyses. Generally over-protection at home producing an inability to face problems for himself is the cause of the hysterical manifestations.

The dissociated or split personality in its serious form occurs in adults as schizophrenia. It may appear in milder forms in children, wherein moods change rapidly without observable cause. Within a month or two the child may change from a happy carefree younster to a morose individual. This is an unconscious attempt to escape from difficulties and conflicts and results from an inability to reconcile some beliefs with others or with the demands of society. Confusional states are often manifested by inability to concentrate; seclusiveness caused by mental preoccupation. When a child begins to lose interest in his school work and especially if an appearance of confusion accompanies it, he may be assuming two personalities. The problems that are troubling him must be ascertained. If he has a feeling of inferiority, he should be placed in an environment where he can succeed with little effort, and as he succeeds, conditions should gradually be made more difficult.

The period of early adolescence often is one of great flexibility, followed by a definiteness and even stubbornness. The positiveness of the adolescent is due partly to his desire to attain prestige by obtaining attention from others. The skepticism of adolescence is a mechanism of rebellion against those whom he considers an authority. Attitudes with strong emotional tone may develop when an individual is forced to make new adjustments without adequate preparation. Defense reactions may be adopted because security is threatened.

Another mechanism the adolescent may resort to in order to attain prestige or gain attention is that of negativism. The method of handling such an individual is not the usual one of argument, but rather to give him a sense of security and ease, to make him see that no one wants to make him appear ridiculous and that his negativism causes people to think less of him rather than more.

Psychotherapy is a branch of the healing arts which seeks to heal mental ailments as medicine seeks to heal organic diseases. It is true that the two types of diseases are interrelated and oftentimes interdependent, but that is a discussion in itself. There are two steps in psychotherapy. The first is to seek the origins of the difficulty in the case history of the individual and to get him to see and face the facts; the second step is to get the individual to set his face toward health and well-adjusted living.

Various methods are employed in psychotherapy. An interview—or rather a series of interviews—is had with the patient during which there is an informal discussion of the problems, the interviewer attempting to establish rapport in order to obtain the complete confidence and cooperation of the individual. A case history may be obtained by a social

worker, and the family, relatives, school teachers and friends may be interviewed. The life history or autobiography of the patient including his experiences, interests, attitudes, his own interpretation of his personality, may be obtained. The various personality tests discussed earlier may be submitted to the patient.

Another method is that of observation of behavior, the observer being unobtrusive watching the child at play. There are various types of observation employed. One is the directed observation in which specific reactions of the child are studied, such as social play, hygienic habits, language, etc. Another is the check list method in which the observer checks the behavior of the child according to a specific list of traits and reactions. In the diary method the observer keeps a running account of his observations. The time sampling method gives a cross-section picture of the child's behavior, the periods of observation being short and repeated frequently.

Suggestion and hypnotism are oftentimes used. A suggestion is an idea or plan of action adopted by an individual without calling it into question. It may be exerted by a person or by circumstances. Hypnosis is the most suggestible state. Suggestions of a curative value are conveyed during the hypnotic state. Hypnosis may be used to obtain the origins of the difficulty and also during the second stage of psychotherapy, that of getting the individual to desire to become well adjusted.

To Sigmund Freud psychotherapy owes a great debt. His theories of psychoanalysis, whether or not one believes in them en toto, did more to focus attention upon psychotherapy and mental hygiene than anything else. The basis of Freud's psychoanalysis is the idea of getting at the root of the trouble by reviving memories. The subject relaxes, becomes uncritical, lets memories and thoughts come as they will. He is warned not to hold back embarrassing material.

Freud believes that the sex conflicts in early childhood are the causes of many of the forms of maladjusted personalities. By his method these early sex conflicts are revived and worked over until the subject understands the desires and conflicts that underlie his difficulties. Then the patient practices handling difficulties in his every day life with frequent conferences with the analyst; and when he can meet his problems with ease, the treatment is terminated.

Another method employed in psychotherapy is that of the faith cure, exemplified by Coue's autosuggestion which was so popular a few years ago. Another type of faith cure is Christian Science and the numerous psycho-isms which have sprouted in the last few years. The faith cure tries to lead the subject to set his face squarely toward health and good adjustment, suppressing all thoughts of ill-health mental or physical, and not attempting to ferret out causes underlying the conflicts.

The attitude of many psychologists toward psychotherapy is one of lofty condescension on the grounds that the latter is too subjective in its methods and not sufficiently statistical or scientifically experimental.

However, psychotherapy has a job to perform—to help individuals readjust thmselves to their environment—and cannot wait for laboratory findings to season for years before putting them into practice.

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FURTHER STUDIES OF THE FUSIONAL CONVERGENCE AMPLITUDE*

Part II.

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Prefatory

For several years the writer has been interested in the possibilities of modifying the tonicity of the extra-ocular musculature. This was especially true in those patients having supposedly low ductive and high phoria anomalies. The limited amount of success despite the use of various techniques and orthoptic instruments, has raised a question concerning the validity of our present-day approach to these problems. This is particularly obvious in the futile attempts which have been made to increase the innervation to the external recti muscles. They have, for the most part, resisted tenaciously any effort to change or modify their inherent basic tone.

A careful survey of the literature in this field indicated the scarcity of relevant data which could be really termed scientifically reliable. In the few cases reported, the methods were vaguely described and in most instances the observations and interpretations were open to criticism.

Realizing the attendant difficulties in dealing with private patients, it was decided to investigate this complex and perplexing problem under conditions which permit a more rigid control of the S's and at the same time a standardization of technique and procedure.

Accordingly, at the Academy meeting in 1933, a summary of an experimental inquiry of the fusional convergence amplitude[1] was presented. In this study, four senior internes of the Pennsylvania State College of Optometry, served as S's and received base-in treatment on the kratometer for a period of approximately two months. Four treatments of twenty minutes duration each, were given daily during this time (Saturday and Sunday excluded). A control period of a week, prior to and immediately after treatment, was included. During this time, the ductions and phorias, for distance and near, were measured twice daily, thus minimizing "unbiased" errors due to chance fluctuations. A com-

*An abridgment of the material presented before the American Academy of Optometry at Cleveland, Ohio, December 17, 1934.

parable set of data was thus recorded. The prism-slides or bars were changed rhythmically to the sound of a metronome adjusted to fifty-six (56) clicks per minute. The outcome of this study showed no appreciable increase in the negative fusional convergence amplitude, as shown by the constancy of the abductions for distance and near. Similarly the phorias remained unchanged, and in so far as they are an indirect measure of the accommodative-convergence relationship, we are justified in believing that this reflex association was likewise not affected.

Present Considerations

Fully cognizant that too few S's had been used in this earlier investigation, the experiment with some variations, was continued in an endeavor to clarify the indefiniteness concerning the neuro-physiological basis controlling the ocular muscle tonus. If a satisfactory method can be evolved to increase the innervation of the extrinsic muscles, in S's with single binocular vision, it may be that similar principles can be applied to strabismic cases—a problem which has intrigued our profession for many years and is still in an unsettled state.

The present approach can conveniently be divided into four parts:

A—The effect of wearing base-in and base-out prisms for a period of one month.

B—A continuation of the base-in therapy employing the same technique briefly described in this report, and more fully discussed in a previous publication. See bibliography.[1]

C—A modification of the procedure to observe the effects of base-out treatment over the same period of time.

D—The effect of rotational movement of the eyes, without the application of accessory prisms in any form.

Procedure (General)

Nineteen male S's were selected for the most part from the freshman and senior classes at the college. Their ages ranged from twenty (20) to twenty-eight (28) years and only those S's who manifested no accommodative or convergent anomalies were chosen. An absence of constitutional or physical disturbances was a necessary prerequisite. The nature and procedure of the experiment was carefully explained to the S's and they were cautioned to adhere faithfully to the instructions, regardless of the outcome.

In this connection it is of prime importance that a uniformity of method be agreed upon, especially as it pertained to the ascertainment of the ductive powers of the eyes. As the previous report indicated, the intensity of illumination must be maintained at a constant value and equal before both eyes, otherwise an appreciable error is introduced. A further precaution requires the development of a technique which permits the rotary prisms to be turned at a constant rate. This is a quite frequent source of error and any attempt at a comparison of data is futile if this factor is disregarded.

The horizontal ductions were ascertained by having the S fixate a Snellen 20/200 letter E at 20 feet. Rotary prisms, forming a part of the DeZeng phorometer, were turned simultaneously, bases in for abduction and bases out for adduction until diplopia ensues. The approximate rate was 80 prism diopters per minute. Blur-point and reversion to fusion were also noted. Fixation for near was at a 1/3 M. upon a 4 mm. black letter E printed on a white card. A Westen "Sight-Meter" enabled the experimenter to check frequently the intensity of illumination before each eye. A prearranged value of 25 foot-candles was constantly maintained.

The same fixation for distance and near was employed in the phoria measurements. In addition a vertical prism of 6 prism-diopters was placed base down before the O.D. The amount of prism base-out or in before the O.S. that caused a vertical alignment of the two E's indicated the degree of esophoria or exophoria. The same procedure was carried out at the near point, allowing sufficient time for the vacillating E to attain equilibrium. Training made it possible for each S to measure his own ductions and phorias. This not only assured greater accuracy and precision, but eliminated a second reaction-time source of error. Furthermore, at any subsequent time desired the S's can notify us of the relative permanency of any changes that the experimental situation accomplished.

With a knowledge of the existing imbalance at the two points of fixation, it is a relatively simple operation to calculate the amount of accommodative-convergence in play under these conditions. The interpupillary distance with the known amount of physiological exophoria can be easily treated to give a remainder which is the accommodative-convergence.

Procedure (Specific)

A—Ten S's (5 hyperopes and 5 myopes) were carefully refracted and the existing ametropia fully corrected. In addition, prisms were prescribed for constant wear during the investigative period. The hyperopes received base-out prisms and the myopes base-in prisms of three prism diopters O.U., arbitrarilly chosen. The S's reported every day to the research clinic to have ductions and phorias recorded. Visual acuity was noted as any reduction might indicate the development of a convergent-accommodative ciliary hypertonicity. The S's tolerated the prisms for an entire month.

B—Two S's received base-in treatment on the Genophthalmic kratometer for a period of two months. Four treatments of twenty minutes each constituted a daily exercise. A control period of a week before and after treatment yielded average values capable of being compared. The prism slides were changed 56 times a minute, in consonance with the tick of a metronome. Both ductions and phorias were recorded before and after each battery of daily treatments.

C—Concurrently, two other S's received base-out on the kratometer, adhering to the same procedure as described in (B), relative to

the time and number of treatments, and the quantitative measurement of the ductions and phorias.

D—The remaining group of 5 S's were submitted to a simple versional type of exercise, which consisted in directing the eyes to a revolving luminous target, projected on a white screen from the tube of a Cameron myoculator. The target was about an inch in diameter and rotated clockwise 36 times per minute, describing a circle of approximately a meter in diameter. Four treatments of fifteen (15) minutes duration each, were given daily for a period of two months. During this time the S's wore their ocular corrections and the fixation of the stimulus-object was binocular. The neuro-muscular status was noted according to the procedure previously described.

Data

A—The wearing of prisms bases-in and bases-out for a period of one month had no apparent effect upon the duction and phoria values as they remained unchanged. Because of this constancy, the data will not be included at this time.

B—The outcome of base-in exercising of two additional cases is briefly summarized below:

	Base-In (Kratometer)					
	Distance			Near		
Subject—A. J. C.	Abd.	Add.	Phoria	Abd.	Add.	Phoria
First control week	6/5	23/8	1 eso	22/19	28/23	7 exo
Final control week	8/6	26/9	ortho	24/15	34/25	6 exo
Subject—A. R. N.						
First control week	8/7	58/48	4 exo	25/24	49/41	15 exo
Final control week	9/7	60+	4 exo	26/24	55/42	15 exo
C—Base-out on Kratometer						
Subject—G. S.						
First control week	5/4	11/6	ortho	15/12	16/11	10 exo
Final control week	4/3	47/24	ortho	16/8	45/33	8 exo
Subject—C. K. D.						
First control week	7/6	27/14	ortho	16/13	22/15	2 exo
Final control week	7/4	58/26	ortho	15/9	50/34	2 exo
D—Version exercise (myoculator)						
Subject—W. L. S.						
First control week	7/5	28/12	1 eso	17/11	32/21	3 exo
Final control week	6/4	38/20	1 eso	19/10	48/28	3 exo

Inasmuch as all five S's showed an increase in the adduction of practically the same amount, only one case will be cited in this preliminary report.

Discussion of Results

The wearing of prisms, bases-in and bases-out for a period of one month had no influence upon either the adduction or the abduction, for near or distance. Neither was any change made in the existing horizontal heretophorias. Several S's reported severe fronto-temporal headaches and other forms of cephalalgia. However, it may be that to an undetermined extent, a part of this discomfort resulted from the S's becoming Optometrically sophisticated as they were receiving lectures at the time on the theory and practice of prism therapy.

For years the prescribing of prisms has been advocated to cure what has been erroneously termed "weak" muscles. This somewhat questionable policy is untenable in light of our recent knowledge concerning neuro-physiological processes. Undoubtedly, relief has occurred in many cases when prisms are worn and the alleviation of symptoms may be attributed to a temporary redistribution of the tonic reciprocal innervation to the extra-ocular muscles. This is in accordance with E. F. Tait's[2] concept of a subcortical reflex mechanism integrating and distributing the impulses which it receives from the accommodative-convergence, fusional convergence, tonic convergence and proximal convergence nuclei. A much more exhaustive investigation must be undertaken in the laboratory and clinic before we can arrive at a satisfactory answer or a final solution to this problem.

A consideration of the effect of base-in calisthenics contributed two additional cases to the original group of four previously reported. Again we find a confirmation that with the technique and procedure used, it has not been possible to increase the negative fusional convergence amplitude to any valid extent. It had been the thought of the writer that this intensive treatment would be more productive of results than is usually possible in private practice. The philosophy upon which this premise was based inferred the establishment and development of a sub-liminal learning process, as the result of deflecting the foveal images out into the peri-macular fusion areas. It was assumed that either one of two possibilities might take place as the result of the application of the "secondary" laws of association:

1. That the efficiency of the cones already in operation would be increased as the result of repeated stimulations causing a strengthening of the associative neural bonds or
2. That the number of functioning cones might increase.

In either case, the fusional amplitude as measured by the amount of base-in prism eliciting diplopia, would be materially affected.

In the two cases studied, base-out prism exercise had a positive effect increasing the adductive amplitude over 100% of its original value. Sherrington's "neurone-synaptic" theory would explain this increase on the assumption of a neural pathway facilitation as the result of repeated stimulation of the same receptors (as the images are deflected into the same peri-macular area with each prism accretion) over an adequate period of time, with a gradual lessening of the synaptical resistance.

Fixating of the circularly-moving light had the same positive effect as base-out prism stimulation. This increase can only be attributed to the operation of the fusional convergence which arises whenever the retinal images slip off into the peri-macular fusion area. The stimulation results in impulses being sent down to the motor nuclei to modify the basic tonic reciprocal innervation in the interest of single binocular vision.

It may be reasoned that the accommodative-convergence is the causative factor in the building-up of the positive fusional amplitude. However, recent studies suggest that this reflex is not normally functioning after initial fixation has occurred. To Sheard[3] is given the credit for introducing a graphic classification of convergences into a tri-partite division of tonic, fusional and accommodative. It was at that time the belief that these three reflexes were in constant use. Modern work has served to partially corroborate and amplify this basic concept until today we believe that accommodative-convergence is in play only when the accommodation is made the dominant factor or stimulus and the convergence the response. This can occur during dissociation when the fusional convergence is held in abeyance, in uncorrected hyperopes and over-corrected myopes. The accommodative-convergence may also assist in the placement of the visual axes at the point of regard, when fixation is changed. We have no satisfactory proof that the latter statement is true.

Although it is evident in this part of the experiment that the visual axes are changing position, yet for accommodative-convergence to operate efficiently a fairly high degree of visual acuity seems necessary. This means that the retinal images are practically on the foveae before the accommodative-convergence reflex arc is set in operation and by that time the fusional convergence has had its display.

A further source of innervation to the extra-ocular muscles is through the proprioceptive nervous system as the result of their contraction and relaxation. Presumably no change was brought about through this medium as no increase in the abductive amplitude was obtained.

Another noteworthy observation is the relative stability of the accommodative-convergence relationship. This reflex association is probably established at an early age and remains unchanged unless upset by some psychic or somatic influence. Apparently sub-liminal associations of this type are dependent upon the inherent nature of the protoplasm in the same fashion that intelligence is thought to be innate and not the direct result of a specific intention on the part of the individual.

Although it was not the purpose of this investigation to consider blur-point phenomena, notation was made where they occurred and it is interesting to observe how constant they are. It seems logical to associate blur-point data with the accommodative-convergence and the convergent-accommodation reflexes. E. F. Tait[4] has offered evidence to show that they are proportional in amount and reciprocal in nature. Prisms stimulate or relax convergence to a point where it is associated with ac-

commodation. At this point any further increase or decrease in the accommodation will place the S's eyes in a state of uncompensated myopia or hyperopia with a resulting blur of the object of regard. In those S's who had a comparatively large amount of accommodative-convergence, the blur-point was relatively small. On the other hand, a smaller amount of accommodative-convergence, indicative of a less efficient association, was invariably accompanied by a larger blur-point value.

This report is essentially a preliminary study and more research in this field must be made before any attempt to formulate a working hypothesis will be of value.

Summary

It is possible that sampling errors may be present because of an inadequate number of cases investigated but tentatively, at least, we can conclude:

1. Experimental evidence has been offered in a limited number of cases to show failure in the development of the negative fusional convergence amplitude, by means of the technique and procedure adopted.

2. Ophthalmic prisms for constant wear over a period of one month had no effect upon ductions or phorias.

3. That in an experimental situation it was possible to develop the positive fusional convergence amplitude with either base-out prism exercises or by rotation of the eyes in a clockwise direction over a circular pattern.

4. That the accommodative-convergence relationship resisted any effort to change it, remaining substantially constant in each of the S's investigated.

5. That quantitative measures of the reversion to fusion show such wide and inconsistent variation, even in the same individual, that the extent of the extra-macular area must be influenced by many factors.

6. That the rationale of vergence calisthenics must await further analysis and description by future research.

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DISCUSSION

DR. HALL: I know all you gentlemen who heard the discussion of Dr. Tait's paper last year were very much interested in hearing him report again today on the new work that has been done along this line.

I should like to ask Dr. Tait one question, and that is regarding the precise instrumentation he used in these base-out experiments.

DR. WILLIAM TAIT: The patient fixed on a small object on a near point card situated at one-third meter distance and the base-out prisms were increased to a point two prism diopters less than the value that would cause diplopia. The target used was the same as that used in last year's base-in experiments.

DR. HALL: I believe that this work of Dr. Tait's certainly bears out the impression that many of us have had, that base-in treatments are of very little value, whereas base-out treatments are of value.

CHAIRMAN MELVIN: Have you ever measured the accommodation on those base-out treatments to see if it changes after the treatment?

DR. WILLIAM TAIT: No, there was no attempt made to make that measurement.

CHAIRMAN MELVIN: Do you feel, then, that the increase in this numerical adductive finding might be due, in a great part at least, to the operation of a learning process which is developing to resist diplopia? What I am trying to do is to rationalize in my own mind why similar results are often gained by both base-out and versional exercises, and if the same condition would exist in both to a degree.

DR. WILLIAM TAIT: In the case of the versional treatment, the increase was not quite as much as the base-out, because of the fact, probably, that the image did not get out as far. The image did not slip off into the extra-macular region as far as it did with the base-out.

DR. NEUMUELLER: I do not think we perform our adduction tests in the right manner. I think it would be better to perform any kind of a test under the same conditions as that under which the eyes are to be used. I refer particularly to the use of small test objects with which to measure ductions such as a small letter "E." The fusional stimulation in such a case is quite small and it is a good deal lower in the peripheral area.

DR. HATHOWAY: The points brought up are very interesting, especially the increase in adductive power through circular or rotary exercise which my own experience corroborates. Many patients are helped by such exercises through the adaptation period after a refractive correction is prescribed.

DR. WILLIAM TAIT: As far as the few subjects that I used are concerned, I had each of them submit to me an introspective report of their reactions. There was no change in their physical well-being, neither did they feel any more comfortable reading after treatment than they did before.

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SUGGESTIONS TO THOSE WHO ADVOCATE THE USE OF VISIBLE LIGHT THERAPY BY OPTOMETRISTS

Until recently, optometric techniques had been restricted largely to various ocular diagnostic and refractive procedures, and also to orthoptic treatment measures, the latter being supplemented at times with ocular diathermy or high-frequency. However, as knowledge of the convergence-accommodative function has increased, so have the number of attempts increased to alter or change the workings of this intimate and intricate ocular neurological relationship. The latest of these attempts has been in the field of visible-light therapy or the selected use of certain portions of the visible spectrum between 3900 A. U. and 7700 A. U.

In brief, the procedure consists of projecting into the open eye or eyes of the patient, radiant energy of a certain predetermined or selected wave length, this for certain definite periods of time. A light source of known quality and quantity is selected and a number of various colored filters are used, these filters absorbing all radiations except those the operator wishes to use.

As far as the writer is able to determine, the theory behind this new form of visible light therapy is briefly this: Normal ocular bio-

physical and biochemical reactions are used to produce certain specific neurological actions and psychic changes as a result of the stimulating or repressing influence of these selected bands on the brain centers controlling vision and all visual reflexes. Apparently it is not intended to produce metabolistic changes in the cell structure of the ocular tissues by means of this therapy but rather only to affect the sensory nervous system as it pertains to each specific accommodative or convergence problem. Thus the use of a selected frequency in the upper end of the spectrum (by means of a red filter) is said to have a stimulating effect on accommodation while a filter in the lower end (of an indigo hue for instance) is reported to have an inhibiting effect.

Now as long as this interference with ocular physiologic processes did not concern itself with more than the possible rearrangement of some of the accommodative-convergence balances the visual hazards from these procedures were not excessive. But when this matter of light therapy is reviewed, the lack of data on the end results of the periodic use of specific portions of the visible spectrum on the tissues of the cornea and crystalline lens to say nothing of the choroid and also their possible physical effect on the sensitive nerve endings in the macula and in the retina in general perhaps merits a word or two of caution.

To be sure, the suggested light therapy does deal principally with the visible spectrum, that exact same spectrum from which radiations are received so well by the eye. However, there are several important differences which must not be overlooked between ordinary seeing and subjecting the eye to the unusual stimulus of receiving but a limited band of radiations from some rather powerful light source for some given period of time. The first of these differences is the consistency of application on the ocular tissues of some one particular band of radiations to the exclusion of all others and its biophysical and biochemical effect on the tissues themselves. The second is the possible effect on ocular tissues of the ultra-violet and the infra-red radiations which though invisible do eminate from every light source. To be sure, the use of glass filters would remove most if not all of the ultra-violet radiations but the invisible infra-red radiations would still exist and their very presence must at least be taken into consideration in the use of a therapy of this character.

Now it is not the intention of the writer to criticise the use of visible light therapy in optometric practice, but rather to suggest that certain things be done which would clarify, to a marked degree, some of the work now being undertaken in this field by those optometrists using these techniques.

For instance, it might be well to first clarify the matter as it relates to ocular pathology. Some evidence has come to the writer's attention that certain types of cataract cases, for instance, were being treated by means of this technique. If this is so, the writer believes this procedure to be a mistake at this time, as the use of visible light therapy by optometrists on cataract cases is bound to react in their disfavor and will,

without a doubt, lay the entire profession open to all sorts of justifiable criticism. In the writer's belief at least, it is well for us as optometrists to confine our activities to matters concerning the refractive and neurological problems of vision. Visible light therapy when used on these latter problems can cause little or no criticism providing the second question which arises in the writer's mind can be satisfactorily answered.

This second point is this: whatever equipment is sold to optometrists to do this work should first be tested clinically and also in some well equipped physics laboratory, these tests to be made in every way, so that a complete knowledge of the lamp's potency can be given the user. In other words, each type of lamp must be tested to see just what kind and quantity of both visible and invisible radiant energy is being generated and passed on to the patient at the time the lamp is in use, in giving the visible light treatments. This is obviously a very important point and unless it is carefully investigated the possibility of injury to the delicate ocular tissues is of course present. Naturally this may have been done, but to date the writer has seen no technical evidence or reports on the matter, and this brings us to the third and final matter which should be done as soon as practicable.

This final point deals with presenting the entire subject to the profession through its technical journals. It is customary in professional fields when new techniques are suggested for general use, among the members of any profession, that the practitioners in that field be given evidence of the value of these suggested techniques through the medium of published clinical case reports as well as through the medium of technical papers dealing with the theoretical side of the work. This has always been the practice in our own profession when new developments were presented and if this new therapy is to be established as an important phase of optometric work this procedure must be followed. The pages of our technical journals are open to these reports and by submitting them, the optometric users of visible light therapy will be doing much to clarify, in the minds of many optometrists, some of the now very obscure phases of this work as well as to materially add to the literature on this and related subjects.

Carel C. Koch.

* * * * *

THE DIAGNOSIS OF GLAUCOMA

The subject of glaucoma divides itself into two principal parts, first, that of primary glaucoma, and next, that of secondary glaucoma. In primary glaucoma the symptoms and increased tension come on without any previous recognizable disease of the eye being present and it is with this form of primary glaucoma that this paper will deal.

Primary glaucoma, like senile cataract, is almost invariably a binocular disease. Yet like cataract, it does not always attack each eye simultaneously, indeed it is more common for the disease to appear in

one eye with an interval of months, or even longer before it appears in the other eye.

Of primary glaucoma there are, from a diagnostic clinical standpoint, two varieties, the first being chronic simple glaucoma and the second being congestive acute glaucoma. The latter may also be chronic. It is, however, well to understand that these different clinical varieties of glaucoma are very liable to run into each other, for example, a chronic simple glaucoma may become congestive, and a congestive glaucoma may, after a period of time has elapsed, become what appears to be a case of chronic simple glaucoma. These are diagnostic variations of the disease which are of particular interest to ophthalmologists who have the treatment of the condition to consider. From an optometric viewpoint it is necessary only, that we as optometrists are able to make a diagnosis and while this may appear to be easy, which it is in some few cases, it becomes very difficult in many, yet the need is evident in every case of glaucoma, particularly in the early stages of the condition.

As I have written before,[1] increased intra-ocular tension is the chief and essential symptom of glaucoma, whatever form of the disease may present itself, although this increased tension may not always be present to the same degree, nor is it necessary for the tension to reach the same high, at every hour of the twenty-four.

In taking the intra-ocular tension, the palpation method, while by no means accurate, is nevertheless a worthwhile and necessary portion of every optometric external ocular inspection, and is something which should precede every refractive examination of the eyes. The technique of this test is simple. The tips of the examiner's index fingers are placed close together on the upper eyelid of the patient while the patient looks down. A gentle pressure is next made with them upon the globe of the eye, through the lid. In a normal case the eyeball will be felt to pit slightly and a sensation of fluctuation is thus given to the fingers. The amount of this pitting or fluctuation is a measure of the tension of the coats of the eye, which in turn of course depends to a very large degree upon the intra-ocular pressure, modified only by the elasticity of the sclerotic coat. After some practice the optometrist will readily differenciate the normal case from one in which the tension is either abnormal or subnormal. Cases in which the tension seems to be greater than normal are recorded as T+1, or T+2, etc., while the normal case is recorded on the case-record-chart as Tn. Cases in which the intra-ocular tension is subnormal are recorded as being T—1, T—2, etc. Obviously any variation from normal merits a most searching external examination, visual field charting and ophthalmoscopic examination. In fact, every case of abnormal tension should, from an optometric standpoint be referred to an ophthalmologist at once, to insure the best possible service to the patient. To be sure, there may be little or nothing he can do at the moment, but at least by so doing the possibility of relief from what

1. Carel C. Koch. A review of the steps to be taken in making an external ocular inspection. Amer. Jour. of Optom. Vol. 6, No. 9, pp. 524-527. 1929.

may be glaucoma has been afforded the patient. In cases of glaucoma, the eyeball is more resistant, and in making the palpation test seems harder than a normal eyeball. And in reality it is harder than a normal globe because the eye itself is too full. The increase in the volume of the contents of the eye is due to an augmentation of the fluid in the vitreous humour supplemented in some cases also by an increase in the blood supply of the eye.

As I have just indicated, perfectly normal eyes may have a tension either below or above the average and in eyes that are above the average it is occasionally difficult to decide whether or not the tension is high enough to make the examiner suspect glaucoma. If it be a question of one eye only, then a comparison of its tension with that of its fellow decides the question as the normal physiological tension is always the same in both eyes. Therefore, cases in which the tension, as taken by the palpation technique, is greater in one eye than in the other are always to be regarded with suspicion, as this frequently is the case in patients suffering from primary glaucoma. I repeat, however, any and all cases of increased intra-ocular tension should be given the benefit of ophthalmological diagnostic advice before further refractive procedure is engaged in.

Increased intra-ocular tension is by no means the only symptom of glaucoma, however, the other symptoms are, to a large degree, due to this increased tension, yet we find that in chronic simple glaucoma that there are fewer severe subjective symptoms than in congestive acute glaucoma. I shall describe these two important forms of primary glaucoma separately. In cases of chronic simple glaucoma, also known as chronic non-congestive glaucoma and sometimes merely as simple glaucoma, the symptoms consist of a gradually increasing dimness of vision in the affected eye. As a rule this is the only complaint, and in these cases it is frequently true that this dimness, while present, is not in itself severe enough to materially reduce visual acuity as measured by test types. This dimness of vision or what might be termed a slight fog before the eyes can in no way be improved by changing the patient's ocular correction. No matter what lenses are placed before this type of patient the fog remains and in some patients this fog is accompanied by what they term as the appearance of rainbow colors around headlights and other bright lights when viewed at night. In cases with these symptoms the tension is usually greater than normal. However, to be on the safe side the optometrist should take the tension on several occasions as it may vary from almost normal to as high as T+2, in the course of a few hours. As I have written on an earlier occasion[2] these visual symptoms are not present in the early stages of chronic simple glaucoma, and when complained of, constitute an important part of the glaucomatous syndrome which must never be overlooked by the examiner.

As a rule, particularly in the earlier stages of chronic simple glaucoma, the external ocular inspection reveals but little. The eye appears

2. Carel C. Koch. Glaucoma. Amer. Jour. of Optom. Vol. 10, No. 8, p. 299. 1933.

to be normal. The pupil still reacts well to light and there is no cloudiness evident in the corneal structures or in the aqueous. Later on in the development of this disease the pupil may appear slightly dilated and its reaction to light may be somewhat sluggish. This is, when noted, another of the valuable symptoms which call for much additional rechecking on the part of the optometrist as it also indicates a possibility of glaucoma. In these cases the external ocular inspection may also reveal a slight shallowness of the anterior chamber. This too, when noted, may be regarded as a symptom of glaucoma although other ocular involvements also have this as a similar symptom. In fact, this symptom is rarely met up with in the earlier stages of chronic simple glaucoma. It is a common symptom of congestive acute glaucoma and of chronic simple glaucoma in its later stages when the diagnosis is fairly easy by other means, yet it is one of the things to watch for in making a slit-lamp examination of the anterior chamber or for that matter in examining the anterior chamber by means of focal illumination, a thing which every optometrist should do as a matter of routine in every examination.

From a diagnostic standpoint, as the writer has pointed out before, [3, 4] the ophthalmoscope is a valuable aid in making a diagnosis of glaucoma. In viewing the fundus with the ophthalmoscope when the lamina cribrosa is found to be pushed back, thus giving the appearance of a cupped disc, glaucoma should immediately be suspected. The reason for this cupping is, that the weakest part of the globe of the eye is at this point, and that any increase in the tension of the eye will at once push the lamina cribrosa back, thus producing the ophthalmoscopic symptom associated with glaucoma. Obviously this occurs in many varying degrees and during the earlier stages of chronic simple glaucoma the symptom may not be in evidence at all. On the other hand, to be sure, not all cases of cupped disc are symptomatic of glaucoma. Many individuals seem to have a perfectly normal deep physiological cup, but all of these patients must be suspected and until they have repeatedly passed all other tests for glaucoma the optometrist should keep them under careful observation. It might be well at this point to refer again[5] to the matter of making one's ophthalmoscopic examination with the patient in a semi-reclining position. If this technique is followed the optometrist will have a far easier time in working around the patient and viewing the fundus from all different angles.

As indicated in the preceding paragraph the cupping of the papilla is a most important ophthalmoscopic symptom of glaucoma and when observed carefully, differs in some patients at least, in appearance from the normal physiological cupping also mentioned. This is true, particu-

3. Carel C. Koch. The Modified Dean Ophthalmoscopic technique. Amer. Jour. of Optom. Vol. 7, No. 1, pp. 42-44. 1930.

4. Carel C. Koch. Direct and Red-Free Ophthalmoscopy. Amer. Jour. of Optom. Vol. 6, No. 5, pp. 304-308, 1929.

5. Carel C. Koch. An easier procedure to follow in making an ophthalmoscopic examination. Amer. Jour. of Optom. Vol. 8, No. 7, pp. 245-246. 1931.

larly in the advanced cases, where the depression or cupping occupies the entire area of the disc and has steep not shelving sides. In fact, in some cases, the walls of the excavation are actually hollowed out thus producing an ophthalmoscopic effect of the retinal vessels being broken off, at the edge of the disc, where they pass around the overhanging edge of the excavation, and become hidden by it, while on the floor of the excavation they again reappear. It might be well to add at this point that in these advanced cases besides being cupped, the optic papilla also becomes atrophied and its consequent pallor also serves as an aid in making the diagnosis between a normal deep physiological cupping and an abnormal cupping of the disc, due to the increased tension.

Another of the ophthalmoscopic symptoms of glaucoma is the pulsation of the retinal arteries. Normally there is no arterial pulsation but in a glaucomatous case the arteries are frequently seen to pulsate particularly when viewed as they cross the optic disc. Should this symptom be missing in a case suspected of having this disease the examining optometrist should attempt to artificially produce the symptom by exerting a slight pressure on the globe of the eye undergoing the examination. In a glaucomatous eye the arteries may be seen to pulsate while in a normal eye they will never do so. It must be understood, however, that this pulsation will not occur in every glaucoma case, yet is never present in a normal one. The explanation for this pulsation of the retinal arteries in cases of glaucoma is that in a normal eye the arterial pressure during both systole and diastole is greater than the intra-ocular tension and therefore the blood flows through the arteries in a continuous stream. In a case of glaucoma, on the other hand, the intra-ocular tension produces such opposition to arterial flow, that the systole alone can make its way through the arterial walls, which can be seen to pulsate as this takes place. Naturally this symptom is evident only in the more severe and advanced cases of glaucoma.

A third ophthalmoscopic symptom of glaucoma occasionally observed is that of a glaucomatous ring. This ring will be observed as a thin whitish ring at the margin of the disc and is due to an atrophy of the choroid, due to the increased pressure. This symptom is only noted in cases showing a cupped disc, and it is of diagnostic value in determining whether or not the cupping is due to increased intra-ocular pressure or whether it is merely a deep physiological cup. In these cases of chronic simple glaucoma the writer has already considered the taking of the intra-ocular tension, the important glaucomatous symptom of dimness of vision, the pupillary appearance and reaction as found in making the external ocular inspection and the ophthalmoscopic fundus picture found in certain cases of glaucoma. I will now take up the fifth and a most important test used in making a diagnosis of glaucoma. This

6. Carel C. Koch. Technic of Perimetry and Campimetry. Amer. Jour of Optom. Vol. 6, No. 7, pp. 421-424. 1929.

7. Carel C. Koch. Charting the Visual Field. Amer. Jour. of Optom. Vol 3, No. 1, pp. 8-10. 1926.

is the perimetric test used in charting the visual field. As I have gone into considerable detail on several occasions[6, 7] in this Journal as to the possible procedures to be followed in making this test, I shall not repeat them here but content myself in saying that every case of suspected glaucoma should have a complete perimetric examination made without delay.

In making this visual field test with the perimeter the portion of the glaucomatous syndrome looked for, is a general contraction of the form field, particularly on the nasal side, as well as a corresponding contraction of the color fields. The blind spot as outlined with a stereo-campimeter may be found to be materially enlarged and various scotomata are common. In these cases the perimeter plays a very important part in our diagnostic work. For instance, in a case of glaucoma, refracted in the early stages of the condition, the only symptom may be the complained of dimness of vision which may of itself, not be severe. In a case of this sort, if the form field is also contracted the evidence at once becomes conclusive and certainly warrants the optometrist calling in an ophthalmologist in consultation. To be sure the perimetric symptom of the contracted form fields may also be symptomatic of primary optic atrophy and for this reason, cases of this type must be kept under daily observation, and tonometer tests be made at constant intervals, for in the early stages of glaucoma the intra-ocular tension may be normal for days, and then suddenly, for a relatively short period, increase materially. This type of observation work is not, however, the duty of the optometrist, but rather that of his consulting ophthalmologist, and the optometrist performs his duty as a clinical diagnostician in weeding out these cases, and seeing to it, that proper measures are at once started to conclusively verify his diagnosis or else have some other made and the case be given whatever therapeutic measures are needed.

A sixth suggested symptom of the glaucomatous syndrome of chronic simple glaucoma has recently been presented to the profession by Dr. J. O. Baxter, Sr.[8] Baxter claims that all low amplitude of accommodation cases and high presbyopic additions should be looked upon with suspicion, and in these cases the previously mentioned tests for glaucoma be made. Baxter also claims to have investigated and followed a number of these cases, most of which were eventually found to be glaucomatous, although showing no symptoms of the disease when his first tests were made. If his findings in this matter are correct, and certain theoretical conclusions might indicate that they were, his conclusions are of vast importance to us as optometrists, as any data which can give early evidence of this condition is obviously of value.

It is in the early stages of these cases of chronic simple glaucoma that the diagnosis is most difficult. At this time the general characteristics of the case differ but little from a normal case, yet it is at this time that

8. Baxter, J. O., Sr. Accommodative insufficiency in glaucoma and general disease. Amer. Jour. of Optom. Vol. 12, No. 12, pp. 468-472. 1935.

the diagnosis must be made if much of value is to be done to assist the patient. Therefore it is of the greatest moment that every optometrist be in a position to make the following ocular diagnostic tests, in all suspected cases of glaucoma, complaining of the symptom of dimness of vision, not relieved by lenses, or in those cases in which the accommodative amplitude is low. These tests are (1) the palpation test for intra-ocular tension; (2) a searching external ocular inspection; (3) a thorough ophthalmoscopic examination and (4) a perimetric and campimetric field charting. These are the tests which will prove of value in these cases, and which will do much to assist us in preserving the vision of persons affected with glaucoma.

As mentioned earlier there are two forms of primary glaucoma. These are chronic simple glaucoma and congestive acute glaucoma. Up to this point I have been largely referring to cases of chronic simple glaucoma and I will now turn to an optometric consideration of cases of congestive acute glaucoma. In these latter cases the increase in the intra-ocular tension is always very marked, and an examination of the anterior chamber[9] shows it to be very shallow. This shallowness of the anterior chamber is caused by the increase in the fluid content of the vitreous humour pressing forward against the crystalline lens and the iris. In these cases the ciliary body is also frequently congested, thus adding to the increase in the intra-ocular tension. In these cases it will also frequently be found, that the refractive power of the eye is greatly diminished, the patient accepting much less plus than heretofore because of the increased anterior-posterior length of the globe of the eye. Here again also, we frequently find a diminution of the amplitude of accommodation, due in all probability to the abnormal pressure on the ciliary nerves as they pass along the inner surface of the sclerotic. In some of these cases the cornea appears to be cloudy, and to a very marked degree becomes insensitive to touch, and in others the entire iris pattern seems misty and indistinct. In these more severe cases the pupil is dilated, and does not react to light. In some it has a decided oval appearance, and in many of these cases small opacities will be found in the aqueous and vitreous humours. The subjective symptoms are those of severe intra-ocular pain and a decided appearance of halos around all lights. The pain in many cases is very severe and in most of these cases the general appearance of the eye is one of marked congestion, the sclera and conjunctiva being very injected, although this is but a reflex symptom as there is no true inflammation as we usually understand it, of these tissues. In these cases the patient also complains of very subnormal vision which cannot be materially helped by means of lenses, and also in these cases the form field if taken on the perimeter, will be materially smaller than normal. The ophthalmoscopic picture, if the media are sufficiently clear to permit one to make a fundus examination, will probably reveal to the examiner a typical glaucomatous cupped disc providing the condition has existed a sufficient time to permit this characteristic ophthalmoscopic symptom to form.

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9. Carel C. Koch. External ocular inspection. Amer. Jour. of Optom. Vol. 3, No. 8, pp. 252-255. 1926.

These are the primary symptoms and characteristics of congestive acute glaucoma. These are not, in their entirety, symptoms of only glaucoma, but many are also symptoms of other ocular diseases. As I have written some time ago[10], from time to time we as optometrists are called upon to make a diagnosis where an error on our part may involve the loss of sight of the patient. I take for instance cases of iritis and glaucoma. Iritis is, as a rule, curable when properly treated through the removal or drainage of the area, which is the seat of the infection causing the iritis and for that matter, glaucoma also can be arrested providing the diagnosis is made early in the progress of the disease. However, time, in glaucoma is an important element and as optometrists it is of primary importance to both the patient and to ourselves that cases of glaucoma can be easily and quickly differentiated from those of iritis. The loss of even a day in certain cases of glaucoma may prove fatal to the vision of the patient. Therefore, as diagnosticians, we must be able to make an accurate and rapid differential diagnosis between the two conditions.

Both have subnormal visual acuity; both suffer considerable pain and in both cases, the pupillary reactions are abnormal. There are, however, certain points of differential diagnosis which will enable the optometrist to send his glaucoma cases to the ophthalmic surgeon at once and which will also permit him to send his iritis cases to the radiologist where the teeth, the maxillary antrum and frontal sinuses can be X-rayed.

These points of differential diagnosis are as follows: In cases of iritis one will find exudates or small dark spots along the iris margin; the depth of the anterior chamber will be normal; the pupil will be decidedly contracted and usually irregular in shape and the iris itself under focal illumination will appear swollen. In glaucoma cases there will be, however, no exudates; the anterior chamber will appear shallow; the pupil will be from a little to a marked degree dilated and slightly oval in shape, usually with the long axes in the ninetieth meridian, and the pupillary reaction will be sluggish. These points of diagnosis should enable an experienced practitioner to differentiate between his glaucoma and iritis cases and while these important observations are by no means new, I feel that the matter is of sufficient importance to again call the attention of the profession to these differential diagnostic signs.

In making the various diagnostic tests in cases of congestive acute glaucoma, it is well then to remember, not only the foregoing differential diagnostic points between iritis and glaucoma but also the following; in making the palpation test the intra-ocular tension will always be high. The external ocular inspection may show one or more of the following conditions: (1) very shallow anterior chamber; (2) some cloudiness in the cornea; (3) lack of sensitiveness in the conjunctiva of the cornea; (4) some clouding of the iris; (5) a partial or full dilation of the pupil; (6) very sluggish pupillary reaction to light; (7) an oval shaped pupil,

10. Carel C. Koch. A differential diagnosis for iritis and glaucoma. Amer. Jour. of Optom. Vol. 7, No. 8, pp. 463-464. 1930.

and (8) a congested appearance of the sclera. The refractive findings may indicate a very low accommodative amplitude or on the other hand the patient may accept much less plus than heretofore. The ophthalmoscope in these cases of congestive acute glaucoma may reveal opacities in the aqueous or vitreous humour and the fundus picture, when you are able to get it may show a cupped disc with the other symptoms of increased intra-ocular pressure. In these cases it is also difficult to use the opthalmoscope because the patient is as a rule, very sensitive to any light being directed into the eye for any period of time. The perimeter will in nearly every case show a marked contraction of the form and color fields and a para-central scotomata of considerable size will surround the blind spot.

The history too is somewhat outstanding and gives considerable assistance to the optometrist if taken properly.[11] It must be kept in mind, that congestive acute glaucoma may begin without any previous symptoms, or it may develop somewhere in the course of a case of simple chronic glaucoma. Usually though there are some symptoms which occur before the first main attack and the history will throw considerable light on the matter. The complaint that the patient's reading glasses seem weak and that at certain times rings are seen around light or that at times the patient has noticed flashes of light accompanied by a shooting pain within the eye lasting for but a moment are all some of the symptoms which precede an attack of congestive acute glaucoma and which when recorded in the history must be regarded seriously. Patients sometimes report short periods of poor vision after which everything seems normal again for a considerable period of time. Careful history taking and a detailed attention to the patient's recital of the onset of his present symptoms will frequently put the optometrist on the track of the condition.

After a principal attack the patient's history will read much different. As usual a severe pain will be complained of, starting suddenly at night and lasting for several hours. The eyes become very congested. Vision is quite poor and all lights are surrounded by halos of light. These symptoms may last several days and then slowly disappear only to return again at the onset of the second attack. Histories of this sort must never be ignored. Every resource at the optometrist's command must be marshalled to assemble every bit of available diagnostic information on this case. These symptoms form an important part of the syndrome of glaucoma from a history taking standpoint and when any one or more than one is complained of the case must be kept under observation.

As I have said, the onset of an acute attack is usually at night. It is accompanied by violent pain radiating through the head from the eye, and by some congestion of the conjunctiva of the cornea, as well as some congestion of the sclera. In many cases there is much lacrimation. Also in some cases the aqueous humour becomes cloudy, the anterior

11. Carel C. Koch. A Routine Refraction. Lectures delivered at the Thirty-first Educational Congress of the A. O. A. Published by the Department of Education of the A. O. A. Eaton, Chio. pp. 21-87. 1928.

chamber shallow, the iris muddy looking, the pupil dilated and its reactions very sluggish and perhaps oval in shape, while the cornea becomes steamy and anaesthetic. In some cases the crystalline lens acquires a greenish color. The patient also often complains of all of the subjective symptoms of photophobia, and of course vision is quite defective in the affected eye. Some history of vomiting may also accompany the attack. It is of course well to remember that in every case of acute glaucoma it is not necessary to have all of these symptoms, which as a group form the glaucomatous diagnostic syndrome indicative of congestive acute glaucoma. Many patients suffering from this condition show but a few of these symptoms and for this reason it is doubly important that every symptom included in this syndrome of glaucoma be carefully searched for, in every presbyopic case, examined by optometrists. To overlook these is possible, even when they are kept in mind, but it is not probable. However, the chances of overlooking them, if they are not kept in mind, is very great, and therefore the matter must be made a routine part of every optometric examination.

An attack of congestive acute glaucoma may, to a certain degree, pass away in the course of a few days, but in its wake some of the symptoms of glaucoma will be left and these can always be found either by means of the external ocular inspection, the use of the ophthalmoscope or the perimeter. As a rule, after such an attack, the pupillary reactions are sluggish and some defects of the visual field are present. The first attack will be followed by another. It may come on again within a few weeks, or it may be a matter of months, but it will occur again. The second attack leaves the eye in even worse condition than the first, and each subsequent attack further reduces vision, and makes it more and more impossible to give the patient relief. The symptoms become more obvious and noticeable. In fact, after several attacks, it would be difficult, in these cases of congestive acute glaucoma, to overlook the condition, even if one wished to do so. A case of this kind, if left to itself, will in time turn into a case of absolute glaucoma, in which all vision is lost. In these cases, the attacks become more and more frequent, and the case becomes hopeless. It is interesting to note also, that even after vision is lost, the intra-ocular tension remains high. The pupil is widely dilated and the iris cloudy, as is the cornea and aqueous. The fundus picture too, if the media is still clear enough to view the disc, shows a severe cupping as well as hemorrhages and optic atrophy. Congestive acute glaucoma frequently attacks both eyes at the same time, and in this particular it varies from chronic simple glaucoma in which the condition will be found to be present in one eye, as a rule, long before any portions of the glaucomatous syndrome appear in the other.

The reason for the rather marked difference between the symptoms comprising the syndrome of congestive acute glaucoma and chronic simple glaucoma, is that, in the former, the increase in the intra-ocular tension is sudden, while in the latter, the increase is gradual and the eye, to a degree at least, becomes accustomed to it. In cases of congestive acute glaucoma,

the circulatory system of the eye has no time to accommodate itself to the new state of things, and therefore the symptomatic response on the part of the patient is greater in the acute form of the condition, although one form is just as serious as the other, and each requires the immediate attention of an ophthalmologist as soon as the optometrist makes the diagnosis. In fact, even if a positive diagnosis cannot be made, for the best interests of the patient a consultation should be had on every case in which there was the slightest suspicion of this disease, as it is only in those cases in which the diagnosis is made early that anything of value can be done to save the vision of the patient so affected.

Carel C. Koch.

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SPECIAL REPORT

SOME INCONSISTENCIES IN THE 18 POINT TECHNIQUE*

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Personally, I have never been greatly impressed with the so-called "18 or 21 point technique" because it has always seemed to me that those who adhere to this method are, either consciously or unconsciously, making a complicated subject out of a very simple one. In order to be as brief as possible, I am going to take the article written by Dr. Louis DeMars in the October, 1935, issue of the AMERICAN JOURNAL OF OPTOMETRY as my background. Now this is not because I wish to attack any one person, but because it will make it more easily assimilated and better understood as to just what is meant. I hasten to say that, personally, I think that Dr. DeMars is entitled to a great deal of praise for his painstaking article. I think he has presented same in a masterful manner, in fact, far better than most writers would even attempt. However, I am going to try to show the fallacy of the 18 point technique, no matter who uses it or writes in its favor, because to me it seems presumptuous in the first place, and it disregards obvious factors that are known to be true, and finally supplants them by speculative calculations that have no foundation in fact.

In the first place we shall now take the case presented in the article above mentioned (page 383).

Here we have the findings of this case.

"(3) Habitual phoria at far, orthopohric" (that is normal reaction)".

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*Submitted for publication January 15, 1936.

"(e) Static retinoscope at 40 inches O.U. + 1.00 D. Sph."

"(f) Dynamic retinoscope at 16 inches O.U. + 2.00 D. Sph."

"(h) Subnective test O.U. + 1.00 D. Sph."

"(j) Adduction—Break 24 base out prism diopters: Recovery 10△."

By looking at the above case it is in an excellent condition, first it is orthophoric, it shows no untoward tendencies. The adduction is admitted to be very good, in fact so good that it becomes suspiciously so.

The subjective test shows + 1.00 D. Sps. O.U. of hyperopia, and Orthophoria. If there is any test that is of any value as to the true condition of any patient it is the static test, as far as actual condition is concerned, and here this case shows +1.00 of hyperopia.

Now is there anyone who can tell how it is possible for any human being to conceal a hyperopic condition EXCEPT by a spasm of the ciliary muscle? If a person sees 20/20 with a plus 1.00 diopter lens he must have that much hyperopia at least. It is possible for him to conceal still greater amount than he actually shows, by having a spasm of the ciliary muscle or of the mechanism of accommodation, but what he actually does Show must be there. Then, when we find a person having 1.00 diopter of hyperopia for distance why should we through a method of speculative conjuring finally arrive at giving him only a plus .50 diopter, just one-half of the actual findings?

Further, the "(f)" dynamic test at 16 inches shows the need for a plus 2.00 D. Sph.

That again indicates that this person is concealing 1.50 diopters because if the eye were perfectly static it would require a plus 3.50 for 16 inches, that is 2.50 for the actual distance and a plus one of hyperopia for 20 feet, which was found at the beginning. The tests so far simply show that the person examined has created a ciliary spasm of accommodation by the retinoscopic light being thrown into the eye. There is no other conclusion, for no person can "suppress" accommodation or "suppress" convergence. A person merely uses what is necessary to accomplish the feat he is trying to do. A muscle can only do one of two things, either contract or relax. No muscle can "push" or suppress action because it is not necessary.

However, we shall now leave the above phase of the subject and go to the final conclusions of this case. Supposing the case above mentioned is considered purely from the standpoint of the 18 point technique, and disregarding all of my objections, there is still, I believe, a very grave error made in the final conclusion of this case, for I do not believe that accommodation can be "locked up" in any manner by any such means as the author describes. When we place a 6△ prism base-down, before an eye, with a pair of cross cylinders before each eye, with minus axis at 180, both eyes are striving to fuse. It matters not whether they are able or unable to fuse, the fact is, I believe, that they are exerting more energy in the effort of fusing than would be actually expended if there

were no cross cylinders or prisms to overcome. If this is true then the above test is useless, misleading, and only a delusion for the operator and a hardship for the patient.

But, be that as it may. The fractions arrived at are faulty. These fractions are formed by using the 1.50 as numerator and 2.50 as denominator of the dioptric values. Then another fraction is formed by using prism diopters, the 10△ adduction in the disassociated test as numerator, over the 15△ necessary for 16 inches, and the conclusion is that the fraction found in the adduction is greater than the one found in the accommodation, and therefore the greater effort is found in the adduction.

But let us stop and figure this out. The author claims (page 385) that they allow +.75 D. Sph. for the first 6 prism diopters of lag and +.37 D. Sph. for each 2 prism diopters in addition to 6.

Then, let us be consistent. The fraction 10/15 is not correct when used in connection with diopters of accommodation, because these two units are not always interchangeable nor are they always equal. If we shall do this problem consistently, and carry out this line of thought, the following will be the correct solution: The unit 10△ of adduction will have to be reduced to same denominations as accommodation diopters. We must add like to like before developing this problem. The unit 10△ of adduction will have to be reduced to the value of accommodation diopters, as follows:

The first 6 units will equal a plus	.75
The other 4 (.37 to each 2) is plus	.75
Or a total of	1.50

The denominator, the 15 must be reduced to accommodation diopters in like manner as follows:

First 6 units equal	plus	.75
The remaining 9 (.37 each 2)	plus	1.75
Or a total of		2.50

Now we complete this fraction by placing the numerator over the denominator and we have 1.50/2.50. Now we find that the above fraction in adduction and that found by DeMars in accommodation are exactly alike, because the numerical result reached by him when put into a fraction also equals 1.50/2.50.

Then, according to my reasoning adduction and accommodation equal exactly the same thing and therefore this case must be orthophoric. And this is more in line with the original findings, for we found in the first place that the subject was orthophoric. We also found he needed a plus 1.00 for distance which fact could not be concealed in any manner, then why not give him this relief?

Now as a final conclusion of the entire subject: When optometrists will come to find out that nature is very simple and that she demands Rest from an overtaxed condition, no matter whether it be in Adduction

or in Accommodation, they will not juggle about with speculative theoretical calculations in order to try to steal from one function and then give it to the other.

We know before we start that both the accommodation and the adduction Must be performed by this same individual. He has them Both to contend with. There is no way whereby he can drop either one. He must contend with Both at the same time.

Why then, try to figure out some theoretical way whereby you may cheat the patient out of his accommodation relief, when you have absolutely Nothing to offer him in return either in the adduction department or in the accommodation function but a set of exercises which will in No Way give the patient any more reserve energy to use, but rather still farther overtax an already Depleted reserve energy?

What we must learn is this most simple fact—That FATIGUE is a principal cause of human ailments, in the last analysis.

What the optometrist can do for his patient is to RELIEVE him from unnecessary exertion and thus save him, as far as this department is concerned from nervous depletion.

If you must use the 18 point technique, try to use it consistently, and do not try to make a simple case complicated. No matter how complicated the routine you follow, the end results will tell the story. Orthoptic treatments are good as far as they go, but they do not take the place of good common sense refraction.

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BOOK NOTICES

STIMULUS-RESPONSE MANUAL. Carl F. Shepard, O.D., and Thomas G. Atkinson, M.D. Published by the Professional Press, 5 N. Wabash Ave., Chicago, Ill., 213 pages, cloth, $5, 1935.

The authors of this book deal with a refractive procedure which they call the stimulus-response system of refraction. This system is based on the following several assumptions: (1) that it is frequently necessary to prescribe in such a manner that the patient be given immediate relief; (2) that diagnostic and refractive tests be made and the case be kept under constant observation so that some more or less accurate determination can be arrived at as to why the case requires the correction it was first necessary to prescribe; (3) to remove as far as possible the cause of the condition, and (4) to arrive as soon as possible at the proper

and more or less lasting correction ultimately to be needed in the case being studied.

According to this system the first routine step is a search for evidence of pathology. In cases which are found to be free from disease, tests called "Manifest" tests are then employed to determine whether the case is to be refracted as a "binocular-pattern" or a "monocular-pattern" case. As a second step, other "Manifest" tests are employed to establish a basis for comparisons. To better understand this it might be said that the case may safely be considered one of merely simple refractive error if the correction of small amounts of refractive error remove all other manifest departures from normal. Following this, what the authors call "Handicap" and "Tolerance" tests are made. These tests are only made if the findings from the manifest tests warrant the examiner making them, and are rarely all made, in any one case. After this is finished the examiner compares the results of the various manifest tests, the handicap tests and the tolerance tests and from these findings makes a tentative diagnosis. These findings also indicate what is needed in the way of other diagnostic tests which are subsequently made to enable the examiner to reach a reasonable diagnosis.

The tests mentioned by the authors are not new. They are in almost every case the exact same tests now being made by optometrists throughout America, but their interpretations are in some respects new and the manner in which they present their subject is unique and shows that much thought has gone into this text on refractive work.

C. C. K.

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THE PRINCIPLES OF OPTOMETRY. By F. L. Mason, M.A., Department of Optometry, University of California, Berkeley, Calif. Published by the author. 385 pages, 101 illustrations, cloth cover, 1936. Price $5.50.

This book, the "Principles of Optometry," is a treatise dealing with the theoretrical and practical aspects of Optometry. Mason is a lecturer in Optometry at the University of California and in writing this book he supplied information on many subjects in optics of value not only to the students but to the practitioners as well.

The book is divided into nine chapters. The visual sensations and derangement of ocular functions caused by structual anomalies of the eye are extensively discussed. Myopia, hypermetropia, astigmatism, pupil size, and abnormal accommodation and their relations to the ocular functions are specifically treated. One chapter is devoted to skiametry and skiaskopy. Here Mason describes in simple terms the laws which govern the direction of motion and speed of shadow movement.

The author had access to considerable clinical data and he utilized

it to very good advantage. Much of this data is shown graphically and many of these graphs are both novel and original. He brings out many points of interest in his discussions on astigmatism.

Some of the newer subjects discussed by Mason in this book are: Ghost images of correction lenses, their cause and method of suppressing them, aniseikonia and its possible influence upon binocular perception of depth, the theoretical basis of the manufacture of contact lenses and methods for extending the range of measurements of an ophthalmometer.

Mason lays the foundation in this book for the comprehension of the methods of functioning of the eyes in bifoveal vision and for the proper interpretation of the visual sensations both normal and abnormal, related to bifoveal perception. In writing this book, the "Principles of Optometry," the author rendered a distinct contribution to Optometry and optical science. J. I. K.

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ABSTRACTS

FIELD STUDIES IN EYE PRACTICE. Harold Simmerman. The Optical Journal and Review of Optometry, Vol. LXXIII, No. 2, pages 14-15, 1936.

Simmerman points out that field studies, either of the form field, or color field, are of little diagnostic value by themselves. These findings must be correlated with the ophtholmoscopic findings, and the case history, to be of value to the examiner. He also suggests the following two rules, which, according to the author, hold true in all color field analysis work; (1) That a toxic condition, of the blood of a patient, caused by a focal infection, causes a loss or contraction of the red and green fields without a similar contraction of the blue field. (2) A mechanical disturbance of the circulatory system causes a contraction of the blue color field without a similar contraction of the fields for both red and green. C. C. K.

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THE FOURTH COMPONENT OF REFRACTION. Chester H. Johnson. Journal of the American Optometric Association, Vol. 7, No. 7, pages 20-21, 1936.

Johnson presents clinical evidence, in this paper, of the value of prescribing absorption glass, for certain patients suffering from fatigue. He suggests the use of several pairs of glasses, made in different intensities of absorption glass, for various uses, and finds these of value in giving his patients greater comfort. While admitting that there were no accurate

objective or subjective tests, to definitely guide the examiner in the matter of prescribing absorption lenses, he nevertheless suggests, an intensive study of each case, with particular reference to the individual ocular requirement of the patient, which will serve as a guide as to the possible need for this type of prescription. C. C. K.

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PITFALLS IN ORTHOPTIC TRAINING. H. W. Gibson. The Optician. Vol. XC, No. 2337, pages 369-370, 1936.

Gibson reviews a few of the common difficulties encountered in orthoptic treatment work and points out, that as a rule, squint cases falling into the following three groups should not be treated by means of orthoptic therapies as the results will be unsatisfactory. (1) Squint cases which give a history of sudden onset with no previous ocular symptoms. These cases are, according to Gibson, usually due to some toxic condition affecting the entire system, as well as the eyes, and cases of this type should first be subjected to a physical examination to remove the source of the infection. (2) Squint cases with an hereditary background, in which there may be some malformation of the extra-ocular structures. The author points out that in this type of case, while at times some results may be achieved, these are as a rule of but small value. (3) Squint cases, the onset of which follows some severe illness. In these cases the author believes it wise to let the patient fully recuperate before attempting any orthoptic remedial measures. C. C. K.

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THE CLINICAL USE OF PROTECTIVE LENSES. G. H. Giles. The Refractionist. Vol. 25, No. 427, pages 22-24, 1936.

Giles points out, that, generally speaking, the range of radiant energy reaching the retina of the eye is from 3900 A. U. to 7700 A. U., in the visable portion of the spectrum and from 7700 A. U. to 15000 A. U. in the invisible infra-red range of the spectrum. He also points out in this paper, that while the shorter ultra-violent radiations below 3900 A. U. do not reach the retina, they do of course enter the eye, and if present in any appreciable quantity, do cause changes in the cell structure of the cornea and crystalline lens. On the other hand, he claims, the longer infra-red radiations, reaching the retina more or less unimpeded, may also prove very harmful. He says further that both the infra-red radiations and the visible spectrum itself can easily produce a definite burn which can be seen clinically with an ophthalmoscope as a small sharply defined red spot, localised and accompanied by swelling and oedema of the retina when the eye is exposed to these radiations to excess.

In these cases the underlying choroid is also frequently congested leaving a permanently pigmented scar as a result. He claims, however, the greatest harm is done to the pigment epitheilum layer of the retina where excess light is absorbed and transferred into heat. Severe cases of this character occur in patients who have been careless in watching an eclipse, or those who have been involved in some sort of an electrical short circuiting accident. Giles treats the subject of glare and retinal fatigue and makes suggestions as to their correction. C. C. K.

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DIATHERMY IN THE TREATMENT OF CATARACT. Thomas G. Atkinson. The Sphere. Northern Illinois College of Optometry, Vol. 2, No. 2, page 2, 1935.

Atkinson suggests the use of diathermy, or short wave radiathermy, in the early stages of the following types of cataract cases; first, those showing a diffuse clouding of the lens; second, those cases in which the opaque striae are present in the peripheral layers of the lens, usually between the outer nuclear layer and the subcapsular zone; and third, types of complicated cataract with deposits, especially those with deposits on the posterior capsule of the lens. Atkinson finds that in treating these three types of cataract cases it is, of course, necessary to start the therapeutic work fairly early in the incipiency of the disease and also if this is done that his record of success is about 80 per cent in the first group of cases, 50 per cent in the second and somewhat less than this in the third. His diagnosis is made first with the ophthalmoscope and then with the slit-lamp. C. C. K.

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A TECHNIQUE OF ANISEIKONIA CONTROL. Charles I. Saks. The Columbia Optometrist. Vol. 10, No. 1, pp. 2-3. 1936.

Saks claims the size and shape of retinal images are determined by the following three factors: (1) Principles of geometrical optics, (2) Intensity of illumination, (3) Physiology of the retina. He also claims it is necessary to consider the retinal image in two phases: (1) As a purely optical image, (2) As a physiological image. The optical image is, Saks claims, determined solely by the principles of geometrical optics. The physiological image calls for a consideration of the physiology of the retina. The author also claims that when an image is made to fall upon the retina, its size may be somewhat increased by stepping up the illumination of the object of fixation. The added intensity stimulates, he claims, more cone fibers. In other words, there is a spreading of the retinal image beyond its acutal confines as determined by the principles of geometrical optics.

The author also points out another example of enlargement of the physiologic image which is seen when reading newsprint first with only one eye, and then with both eyes. Reading with both eyes is according to Saks, comparable to reading with one eye with an increase in illumination. Another very common example of this is the increase in visual acuity when changing from monocular to binocular fixation.

Saks finds also that aniseikonia exists in every pair of normal eyes, when viewing a solid object. This, he claims, cannot be avoided since an object is viewed simultaneously from two different positions. As is readily seen, the greater the interpupillary distance, the greater will be the disparity of images. Therefore, he finds, we are dealing with two types of aniseikonia: (1) Physiologic aniseikonia (disparate images), only when viewing solid objects, (2) Abnormal aniseikonia, such as is found in cases where the corresponding images of a plane object (having only two dimensions) are unequal in size, shape or both.

Saks then presents the following technique to determine aniseikonia of retinal origin. Keeping the illumination constant, with the aniseikonia trial size lenses, determine the percentage of aniseikonia (if any) using the distant and near test charts. In the event that aniseikonia is found to be present, and placing the necessary iseikonic lenses before the eyes, have the patient look at the near chart. Now increase the illumination in appreciable amounts. If aniseikonia again manifests itself, it is very likely, claims Saks, that the cause is of retinal origin. The illumination should then be increased further to determine if any additional aniseikonia can be revealed. The eye having the larger image has, he believes, more cone receptors per unit area of retina. If this is true, claims Saks, and if the aniseikonia is partly or wholly of retinal origin, it is readily apparent that it will vary with the amount of illumination. This may, claims Saks, be one reason why iseikonic lenses do not always give the desired relief. This may also, he suggests, be the beginning of the optometrist's prescribing intensity of illumination in conjunction with iseikonic lenses. Perhaps two pairs of iseikonic lenses may be necessary, one for intense and the other for low illumination use.

Saks suggests also that the control of aniseikonia may be exercised by the following methods: (1) Iseikonic lenses, (2) Smoked lenses. Regarding the latter if one views the letters of the test chart, occlude one eye and then place a shade "D" smoked lens before the uncovered eye, the test letters appear to diminish in size. The same effect will be caused by a sudden decrease of the illumination intensity. Since fewer receptors are stimulated, there is less spreading of the physiologic image. As he mentioned previously, the purely optical image remains unchanged in size. He therefore claims that by determining the percentage increase of illumination intensity (in terms X) necessary to cause aniseikonia, the smoked lens having an absorption value of X will be the one to be prescribed before the eye having the larger image. C. C. K.